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EXAMINER	
CHUO, TONY SHENG HSIANG	
ART UNIT	**PAPER NUMBER**
1746	

DATE MAILED: 05/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/782,520	CLINGERMAN ET AL.	
	Examiner	Art Unit	
	Tony Chuo	1746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-50* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-50* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *2/19/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 43-45 and 50 are rejected under 35 U.S.C. 102(b) as being anticipated by Fuller et al (US 6068941). Regarding claim 43, the Fuller reference teaches a fuel cell system comprising a fuel cell having an anode side with an anode inlet and a cathode side with a cathode inlet where the fuel cell is operable to convert a hydrogen-containing reactant on the anode side and an oxygen-containing reactant on the cathode side into electricity, an anode effluent and a cathode effluent; a hydrogen-containing reactant source connected to the anode inlet; an oxygen-containing reactant source connected to the cathode inlet; a low voltage blower "30" connected to the cathode inlet and operable to supply oxygen-containing reactant from said oxygen-containing reactant source to the cathode inlet; and a high voltage compressor "30" connected to the cathode inlet and operable to supply oxygen-containing reactant from said oxygen-containing reactant source to the cathode inlet (See column 3, lines 7 and 25-27). Regarding claim 44, 45, and 50, it also teaches a low voltage power source that is a battery that drives the blower and oxygen containing reactant stream that is ambient air (See column 2, lines 38-39 and column 3, line 7-9).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claim 46 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fuller et al (US 6068941) in view of Thomas et al (US 5670266). The Fuller reference is applied to claims 43-45 and 50 for reasons stated above. However, the reference does not expressly teach a low voltage power source that is a capacitor. The Thomas reference does teach a power source that is a capacitor (See column 1, lines 14-15). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Fuller fuel cell system to include a low voltage power source that is a capacitor in order to deliver power in response to power pulses and spikes required by the blower.

5. Claims 47 and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fuller et al (US 6068941) in view of Stuhler et al (US 6612385). The Fuller reference is applied to claims 43-45 and 50 for reasons stated above. However, the reference does not expressly teach a compressor that is powered by the fuel cell once the fuel cell is producing voltage above a predetermined value. The Stuhler reference does teach a compressor that is powered by the fuel cell once the fuel cell is producing voltage above a predetermined value (See column 1, lines 52-55). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made

to modify the Fuller fuel cell system to include a compressor that is powered by the fuel cell once the fuel cell is producing voltage above a predetermined value in order to more efficiently utilize the power generated by the fuel cell to power internal components of the system.

6. Claim 49 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fuller et al (US 6068941) in view of Zhang et al (US 2004/0131898). The Fuller reference is applied to claims 43-45 and 50 for reasons stated above. However, the reference does not expressly teach a blower that is powered by the fuel cell. The Zhang reference does teach a blower that is powered by the fuel cell (See paragraph [0011]). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Fuller fuel cell system to include a blower that is powered by the fuel cell in order to simplify the system and more efficiently utilize the power generated by the fuel cell to power internal components of the system.

7. Claims 1-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stuhler et al (US 6612385) in view of Fuller et al (US 6068941). The Stuhler reference teaches a method of fuel cell start-up for a fuel cell system having a hydrogen source connected to an anode inlet of a fuel cell stack, an oxygen source connected to a cathode inlet of the fuel cell stack, the cathode inlet being connected to a high voltage compressor, the method comprising: introducing hydrogen to the anode inlet of the fuel cell stack; and producing a voltage output with the fuel cell stack. It also teaches applying an electrical load to the fuel cell stack via the compressor "2" for supplying additional oxygen to the cathode inlet; and increasing the electrical load applied to the fuel cell stack via the compressor over time to supply additional oxygen to the cathode

inlet. It also teaches monitoring the voltage output of the fuel cell stack by the control device "10" and wherein applying an electrical load to the fuel cell stack via the compressor is initiated after the voltage output of the fuel cell stack has reached a predetermined value. It also teaches increasing the electrical load applied to the fuel cell stack via the compressor over time is performed gradually. It also teaches increasing the electrical load applied to the fuel cell stack is performed by a control device "10" that monitors cell voltages of the fuel cell stack and commands a compressor motor to load the fuel cell stack and to increase the load on the fuel cell stack as the cell voltages of the fuel cell stack increase (See column 1, lines 49-63 and column 4, lines 47-52). It is well known in the art that fuel cells operate at a positive net power under normal operating conditions. Therefore, increasing the electrical applied load to the fuel cell stack is performed until the fuel cell stack produces enough electrical power to operate at a positive net power. However, the reference does not expressly teach operating a low voltage blower with the low voltage power source for supplying oxygen to the cathode inlet of the fuel cell, decreasing the operation of the blower over time as the voltage output of the fuel cell stack increases, ceasing operation of the blower when the voltage output of the fuel cell stack has reached a predetermined value, ceasing operation of the blower when the voltage output of the fuel cell stack is sufficient to support operation of the compressor, introducing hydrogen to the anode inlet that includes opening a valve to release hydrogen flow to the anode inlet, and a valve that is opened either manually or by an electronic solenoid. The Fuller reference does teach operating a low voltage blower "30" with the low voltage power source for supplying oxygen to the cathode inlet of the fuel cell, decreasing the

operation of the blower over time as the voltage output of the fuel cell stack increases, ceasing operation of the blower when the voltage output of the fuel cell stack has reached a predetermined value, ceasing operation of the blower when the voltage output of the fuel cell stack is sufficient to support operation of the compressor, introducing hydrogen to the anode inlet that includes opening a valve to release hydrogen flow to the anode inlet, and a valve that is opened either manually or automatically usually by a solenoid (See column 2, lines 33-36, column 3, lines 7-9 and 25-27). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Stuhler method of fuel cell start-up for a fuel cell system to include operating a low voltage blower with the low voltage power source for supplying oxygen to the cathode inlet of the fuel cell, decreasing the operation of the blower over time as the voltage output of the fuel cell stack increases, ceasing operation of the blower when the voltage output of the fuel cell stack has reached a predetermined value, ceasing operation of the blower when the voltage output of the fuel cell stack is sufficient to support operation of the compressor, introducing hydrogen to the anode inlet that includes opening a valve to release hydrogen flow to the anode inlet, and a valve that is opened either manually or automatically usually by a solenoid in order to provide a limited flow of air during start-up so that the cells are not damaged while the fuel cell is heating up and ramping up the voltage.

8. Claims 13-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stuhler et al (US 6612385) in view of Fuller et al (US 6068941) and further in view of Zhang et al (2004/0131898). The Stuhler reference in view of Fuller reference teaches a method of fuel cell start-up for a fuel cell system having a hydrogen source connected

to an anode inlet of a fuel cell stack, an oxygen source connected to a cathode inlet of the fuel cell stack, the cathode inlet being connected to a high voltage compressor and to a low voltage blower, the method comprising: introducing hydrogen to the anode inlet of the fuel cell stack; and producing a voltage output with the fuel cell stack. They also teach applying an electrical load to the fuel cell stack via the compressor for supplying additional oxygen to the cathode inlet; and increasing the electrical load applied to the fuel cell stack via the compressor over time to supply additional oxygen to the cathode inlet. They also teach monitoring the voltage output of the fuel cell stack by the control device "10" and wherein applying an electrical load to the fuel cell stack via the compressor is initiated after the voltage output of the fuel cell stack has reached a predetermined value. They also teach increasing the electrical load applied to the fuel cell stack via the compressor over time is performed gradually. They also teach increasing the electrical load applied to the fuel cell stack is performed by a control device "10" that monitors cell voltages of the fuel cell stack and commands a compressor motor to load the fuel cell stack and to increase the load on the fuel cell stack as the cell voltages of the fuel cell stack increase. It is well known in the art that fuel cells operate at a positive net power under normal operating conditions. Therefore, increasing the electrical applied load to the fuel cell stack is performed until the fuel cell stack produces enough electrical power to operate at a positive net power. They also teach decreasing the operation of the blower over time as the voltage output of the fuel cell stack increases, ceasing operation of the blower when the voltage output of the fuel cell stack has reached a predetermined value, ceasing operation of the blower when the voltage output of the fuel cell stack is sufficient to support operation of the compressor.

They also teach introducing hydrogen to the anode inlet that includes opening a valve to release hydrogen flow to the anode inlet and a valve is opened either manually or automatically usually by a solenoid. However, the references do not expressly teach operating the low voltage blower with the voltage of the fuel cell for supplying additional oxygen to the cathode inlet of the fuel cell via the blower. The Zhang reference does teach operating a blower with the electrical power generated by the fuel cell stack (See paragraph [0011]). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Stuhler method of fuel cell start-up for a fuel cell system to include operating the low voltage blower with the voltage of the fuel cell in order to simplify the system and more efficiently utilize the power generated by the fuel cell to power internal components of the system.

9. Claims 25-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stuhler et al (US 6612385) in view of Fuller et al (US 6068941) and Zhang et al (2004/0131898) and further in view of Pearson et al (US 2004/0126632). The Stuhler reference in view of Fuller and Zhang references teaches a method of fuel cell start-up for a fuel cell system having a hydrogen source connected to an anode inlet of a fuel cell stack, an oxygen source connected to a cathode inlet of the fuel cell stack, the cathode inlet being connected to a high voltage compressor and to a low voltage blower, the method comprising: introducing hydrogen to the anode inlet of the fuel cell stack; operating a blower with the voltage of the fuel cell; supplying oxygen to the cathode inlet of the fuel cell via the blower; and increasing the voltage produced by the fuel cell over time. They also teach applying an electrical load to the fuel cell stack via the compressor for supplying additional oxygen to the cathode inlet; and increasing the

electrical load applied to the fuel cell stack via the compressor over time to supply additional oxygen to the cathode inlet. They also teach monitoring the voltage output of the fuel cell stack by the control device and wherein applying an electrical load to the fuel cell stack via the compressor is initiated after the voltage output of the fuel cell stack has reached a predetermined value. They also teach increasing the electrical load applied to the fuel cell stack via the compressor over time is performed gradually. They also teach increasing the electrical load applied to the fuel cell stack is performed by a control device that monitors cell voltages of the fuel cell stack and commands a compressor motor to load the fuel cell stack and to increase the load on the fuel cell stack as the cell voltages of the fuel cell stack increase. It is well known in the art that fuel cells operate at a positive net power under normal operating conditions. Therefore, increasing the electrical applied load to the fuel cell stack is performed until the fuel cell stack produces enough electrical power to operate at a positive net power. They also teach decreasing the operation of the blower over time as the voltage output of the fuel cell stack increases, ceasing operation of the blower when the voltage output of the fuel cell stack has reached a predetermined value, ceasing operation of the blower when the voltage output of the fuel cell stack is sufficient to support operation of the compressor. They also teach introducing hydrogen to the anode inlet that includes opening a valve to release hydrogen flow to the anode inlet and a valve is opened either manually or automatically usually by a solenoid. They also teach maintaining the voltage of the fuel cell by a control device that monitors the cell voltages of the fuel cell stack and commands the selective introduction of hydrogen and selective operation of the blower. However, the references do not expressly teach operating the fuel cell stack in a stand-

by mode when normal operation of the fuel cell stack is not needed, where operating the fuel cell stack in the stand-by mode including: monitoring a voltage of the fuel cell stack; maintaining the voltage of the fuel cell stack above a predetermined minimum value by: selectively introducing hydrogen to the anode inlet of the fuel cell stack; and selectively operating the low voltage blower with the voltage of the fuel cell stack to supply oxygen to the cathode inlet of the fuel cell stack via the low voltage blower; allowing the voltage of the fuel cell stack to decrease to a predetermined value before introducing hydrogen and operating the blower; allowing the voltage of the fuel cell stack to decrease to the predetermined value is done repetitively; hydrogen is not introduced and the blower is not operated while the voltage of the fuel cell stack is allowed to decrease to the predetermined value; and introducing a steady light stream of hydrogen to the anode inlet of the fuel cell stack and supplying a steady light stream of oxygen to the cathode inlet of the fuel cell stack via the blower. The Pearson reference does teach operating the fuel cell stack in a stand-by mode when normal operation of the fuel cell stack is not needed by continuously running in a low output mode (See paragraph [0012]). It is well known in the art that by running in a low output mode, the voltage of the fuel cell is monitored and maintained above a predetermined minimum value by selectively introducing a steady light stream of hydrogen to the anode inlet of the fuel cell stack and selectively operating the low voltage blower with the voltage of the fuel cell stack to supply a steady light stream of oxygen to the cathode inlet of the fuel cell stack via the low voltage blower. It is also well know in the art that by switching from normal operating mode to standby mode, the voltage of the fuel cell stack will decrease to a predetermined value before introducing hydrogen and operating

the blower. It is also well known in the art that allowing the voltage to decrease to the predetermined value is done repetitively in order to maintain a steady state condition. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Stuhler method of fuel cell start-up for a fuel cell system to include operating the fuel cell stack in a stand-by mode when normal operation of the fuel cell stack is not needed by continuously running in a low output mode in order to improve the response time of the fuel cell system to reach full operating power.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tony Chuo whose telephone number is (571) 272-0717. The examiner can normally be reached on M-F, 8:30AM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on (571) 272-1414. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TC 5/4/06

MICHAEL BARR
SUPERVISORY PATENT EXAMINER